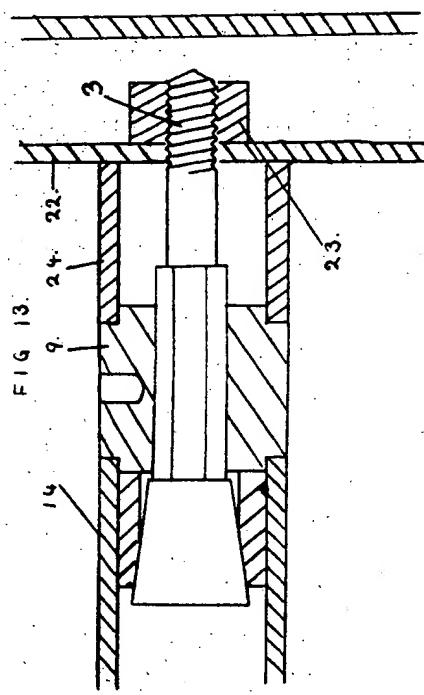
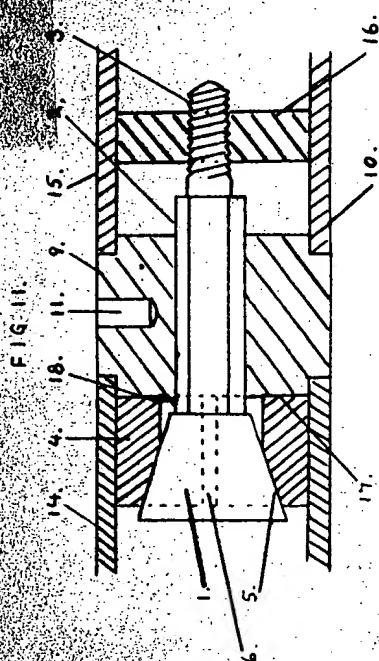
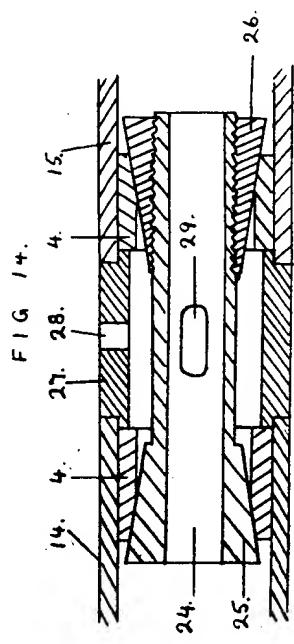
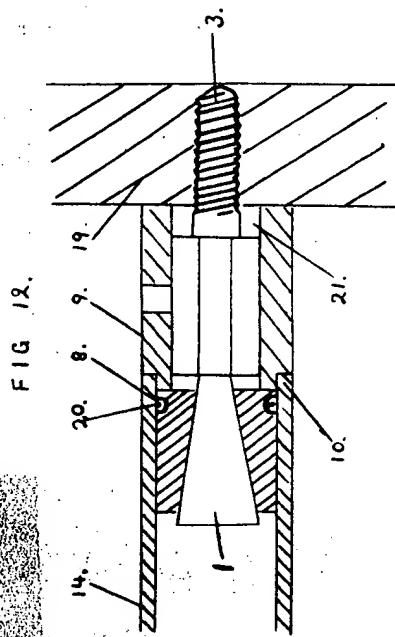


663755

1451-12

9"
532 SHEETS
SHEET 2

85
214

PATENT SPECIFICATION

663.



Date of filing Complete Specification: June 20, 1949.

Application Date: June 19, 1948. No. 16558/48.

Complete Specification Published: Dec. 27, 1951.

Index at acceptance:—Class 99(i), G(12: 24d4).

PROVISIONAL SPECIFICATION

Improvements in the Attachment of Tubes to other Tubes or to Prepared Anchorages

We, ALFRED THOMAS PORTER, 195A, Albany Street, London, N.W.1, British, and GORDON MACKELLAR ROBERTS, 3, Trinity Crescent, Upper Tooting, 5 London, S.W.17, British, do hereby declare the nature of this invention to be as follows:—

This invention has for its object means for joining tubes in alignment or at 10 angles or for the attachment of tubes to plain surfaces.

In carrying this invention into effect we provide a specially shaped bolt with a 15 conical head, a split sleeve, a collar and a nut or anchorage and the parts may be made of steel or other metal or any suitable material to perform the function for which they are intended.

The tubes to which this invention 20 applies may be of steel or other metal or any material suitable for the purpose and is applicable to tubes of any diameter and thickness to which this invention may be usefully employed.

25 The bolt with conical head may be constructed from one piece of material or the conical head may be of a separate piece of material and attached thereto by screwing, rivetting or other known means.

30 The conical head has its larger diameter towards the extreme end of the bolt and the reduced diameter towards the bolt stem, the larger diameter of the conical head should be an easy fit within the tube

35 to which it is to be applied, the length of the stem is determined by the use to which it is to be applied and the section of the bolt stem as hereinafter described, the end of the stem is threaded to screw

40 into the nut or fitting to which it is to be screwed. The stem of the bolt may be hollow or of tubular construction if required.

45 The split sleeve is of a diameter to freely enter the tube and is preferably

bored conically to abut against the conical head of the bolt, it has a longitudinal so that the outer diameter is capable expansion if forced on to or against conical head of the bolt to grip exterior of the tube. The split sleeve may be machined from the solid or made from tube and afterwards split or made from sheet metal and suitably formed.

The collar may be of any convenient size but is preferably equal in diameter to the external diameter of the tube: it is of advantage to have a reduced portion on either side to fit the intermediate diameter of the tube, so as to register the tubes and assist in keeping them in alignment. The function of the collar is to effect the rotation of the conical headed bolt when required, for which purpose the collar is a sliding fit on the shank of the bolt while rotation between the two is secured by a key or keyway shaped section such as a square, hexagonal or other regular or irregular shape splines or driving pin or any other known means of transmission. To operate the collar the method of rotation may be a tommy bar or "C" spanner or by providing flats for an ordinary spanner or other suitable means, or where the bolt is of tubular construction holes may be provided for a tommy bar to engage with the collar and bolt.

The simplest form to illustrate the application of this invention is where tubes of equal diameters are to be joined together. For this purpose a second sleeve of similar construction to the above described is provided and the tube to fit the screwed end of the bolt is of similar conical shape as the conical head of the bolt. The fitting is assembled by placing the split sleeve against the head of the bolt so that the conical surfaces abut and passing the collar along

stem, the second split sleeve is now passed on the stem and the nut screwed on so that the conical surfaces again abut, the larger diameter of the nut being furthest 5 from the collar, the tubes are passed over the split sleeves and register against the collar. The collar is now rotated to screw the bolt into the nut and as the tightening process is continued the split 10 sleeves are gripped between the collar and the approaching cones of the conical bolt-head and nut and are thus expanded into the tube which the split enables them to do. When fully screwed up the tubes are 15 gripped internally and are forced against the collar firmly and in alignment. It is important that the split sleeves are of sufficient dimensions to prevent the head of the bolt and the nut from coming into 20 contact with the collar.

Alternatively we may fix a nut into one tube such as by brazing or other known method to take the threaded end of the bolt and the collar is operated as above 25 described expanding the split sleeve into the other tube.

Alternatively where the tube is to be fixed to a plain surface provision is made for the threaded portion of the bolt and 30 the collar is operated as above described expanding the split sleeve into the tube.

In joining two tubes at right angles we

provide a conical headed bolt, split sleeve and collar as above described, but in this instance make provision for the reception 35 of the threaded end of the bolt by strengthening the attachment tube if necessary by welding, brazing or other suitable means, a reinforcement of metal or by the insertion of a suitably shaped 40 nut to fit inside the tube, or by reinforcing the tube and fitting a nut on the extreme diameter. We may also provide a shaped distance piece between the collar and the attachment tube to give greater strength 45 and rigidity.

This form of construction affords a rapid means of assembly and as the parts can be taken to pieces and reassembled at the destination there is a saving of pack- 50 ing and transport charges.

We do not confine ourselves to any definite size or shapes of the tubes to be used or to the materials of which the various parts are constructed, or to the 55 use to which this form of construction may be adapted, but may vary the construction and the method of attachment to any form of tubular structure to which it may be applicable without exceeding 60 the scope of this invention.

Dated this 19th day of June, 1948.

G. M. ROBERTS,

A. T. PORTER.

COMPLETE SPECIFICATION

Improvements in the Attachment of Tubes to other Tubes or to Prepared Anchorages

We, ALFRED THOMAS PORTER, 195A, Albany Street, London, N.W.1, and GORDON MACKELLAR ROBERTS, 3, Trinity 65 Crescent, Upper Tooting, London, S.W.17, both British Subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and 70 ascertained in and by the following statement:—

This invention has for its object means for joining tubes in alignment or at angles or for the attachment of tubes to 75 plain surfaces.

In carrying this invention into effect we provide a specially shaped bolt with a conical head, a split sleeve, a collar and a nut or anchorage and the parts may 80 be made of steel or other metal or any suitable material to perform the function for which they are intended.

The tubes to which this invention applies may be of steel or other metal or

any material suitable for the purpose and 85 is applicable to tubes of any diameter and thickness to which this invention may be usefully employed.

The bolt with conical head may be constructed from one piece of material or 90 the conical head may be of a separate piece of material and attached thereto by screwing, rivetting or other known means. The conical head has its larger diameter towards the extreme end of the bolt and 95 the reduced diameter towards the bolt stem, the larger diameter of the conical head should be an easy fit within the tube to which it is to be applied, the length of the stem is determined by the use to 100 which it is to be applied and the section of the bolt stem as hereinafter described, the end of the stem is threaded to screw into the nut or fitting to which it is to be screwed. The stem of the bolt may 105 be hollow or of tubular construction if required.

The split sleeve is of a diameter to freely enter the tube, and has a coned inner surface to abut against the conical head of the bolt, it has a longitudinal slit or slits so that the outer diameter is capable of expansion if forced on to or against the conical head of the bolt to grip the interior of the tube. The split sleeve may be machined from the solid or made from tube and afterwards split.

The collar may be of any convenient size but is preferably equal in diameter to the external diameter of the tube and it is of advantage to have a reduced portion on either side to fit the internal diameter of the tube, so as to register in the tubes and assist in keeping them in alignment. The function of the collar is to effect the rotation of the conically headed bolt when required, for which purpose the collar is a sliding fit on the stem of the bolt while rotation between the two is secured by a key or keyway, a shaped section such as a square, hexagon or other regular or irregular shape, splines or driving pin or any other known means of transmission. To operate the collar the method of rotation may be by a tommy bar or "C" spanner or by providing flats for an ordinary spanner or other suitable means, or where the bolt is of tubular construction holes may be provided for a tommy bar to engage both collar and bolt.

In order that our invention may be fully understood, we will proceed to explain same with reference to the accompanying drawings and numbers of reference marked thereon.

Fig. 1 is a view of the conical headed bolt where (1) is the conical head tapering towards the stem (2) and (3) is the screwed end.

Fig. 2 is an end view of the bolt showing the stem (2) which in this case is a hexagon, but the shape of the stem may be varied as hereinafter described.

Fig. 3 is a sectional view showing the bolt head (4) of a separate piece of metal and attached to the stem by screwing or other suitable means.

Fig. 4 is a further variation of the design of the bolt in which the head (1) is machined from material of which the stem (2) is the sectional stock.

Fig. 5 is a sectional view of the split sleeve where (4) represents the diameter to freely enter the tube and (5) is the coned inner surface to fit over the bolt head (1). (6) represents the line where the sleeve is split.

Fig. 6 is an end view of the sleeve showing the line (6) where the sleeve is split, but we may continue the split through lines (6) and (7) to cut the sleeve

into two pieces, but we do not restrict ourselves as to the number of cuts we may make.

Fig. 7 is a sectional view of the sleeve cut in halves or sections with a groove (8) 70 to receive a retaining wire. This is of advantage when using a bolt as shown in Fig. 4 where the sleeve must be in halves or sections and the retaining ring holds the parts together, shown particularly 75 see (20) Fig. 12.

Fig. 8 illustrates the collar in which (9) is the external diameter and is usually the same as the external diameter of the tubes to be joined, (10) is the reduced diameter to register the tubes in alignment, (11) shows a tommy hole by means of which the collar is rotated by a tommy bar or "C" spanner, while (12) is the hole through which the stem of the 85 bolt passes.

Fig. 9 is an end view of the collar showing the hole (12) as hexagon shape, which enables the collar to slide along the bolt stem while any rotation of the collar 90 rotates the bolt, we do not confine ourselves to a hexagon shape, the same effect may be obtained by a key or keyway, a shaped section such as a square or other regular or irregular shape, splines or 95 driving pin or any other known means of transmission.

Fig. 10 is an end view of the collar showing flats (13) (13) in which case the collar can be rotated by a spanner. 100

Fig. 11 shows a sectional view of the device complete showing two tubes (14) and (15) assembled in alignment. In the interior of tube (15) at a suitable distance from the end is a nut or anchorage (16) 105 suitably secured by welding, brazing or other known means, screwed to receive the end of the bolt (3). If a tommy bar is now inserted into hole (11) and rotated to screw the bolt into nut (16) the bolt 110 head (1) is pressed against the inner surface of the split tube (5) making firm contact against the collar at (17), further rotation of the collar expands the outer diameter of the sleeve (4) forcing it 115 against the interior of the tube (14), the split or splits (6) being opened to allow of the expansion, further rotation of the collar is continued until the tubes are securely and firmly held in alignment. 120 Provision is made in the construction of the bolt that when screwed home there is clearance (18) between the bolt head and the face of the collar.

Fig. 12 shows a sectional view of the 125 device where a tube (14) is screwed to a plane surface (19). In this view we have for convenience shown a bolt as illustrated in Fig. 4 with head (1) machined from the sectional stock and the split cone 130

having groove (8) to receive a retaining wire (20). The collar (9) in this type of fitting is only reduced on one side at (10) the other side of the collar bears against the plane surface (19) and clearance between the stem of the bolt and the anchorage must be provided at (21).

Fig. 13 shows one method of attaching tube (14) to a tube (22) at right angles in which case a nut or anchorage is provided here shown as (23) within the tube (22) into which the end (3) of the bolt is screwed. It is preferable in this instance to employ a short length of tube (24) as a distance piece, between the collar (9) and the tube (22) which may either be secured by welding or other means or loose if required, so as to give a better finish and firmer hold in making the joint. We do not confine ourselves to this particular form of attachment by means of the nut (23) but may make provision for the threaded end of the bolt by strengthening the attachment tube if necessary by welding, brazing or other suitable means, a reinforcement of metal or by reinforcing the tube and fitting a nut on the extreme diameter.

Fig. 14 is a sectional view of this device in which two tubes (14) and (15) are joined together by a hollow bolt (24) with conical head (25) with threaded end (26), (4) (4) are the split sleeves, (26) is the conical nut screwed to receive the threaded end of the hollow bolt, (27) is the collar with hole (28) for tommy bar while in the hollow bolt is a suitable slot (29) in which the tommy bar can be engaged to turn the hollow bolt.

40 The above forms of construction afford a rapid means of assembly and as the parts can be taken to pieces and reassembled at the destination there is a saving of packing and transport charges.

45 We do not confine ourselves to any definite size or shapes of the tubes to be used or to the materials of which the various parts are constructed, or to the use to which this form of construction 50 may be adapted; but may vary the construction and the method of attachment to any form of tubular structure to which it may be applicable without exceeding the scope of this invention.

55 Having now particularly described and ascertained the nature of our said invention and by what means the same is to be performed, we declare that what we claim is:—

60 1. In means for joining tubes by an expanding split sleeve in alignment or at angles or for the attachment of tubes to plane surfaces a bolt with a conical head tapering towards the stem in combination

65 with a collar preferably reduced to

register inside the tubing to ensure alignment, the collar to be a sliding fit upon the stem of the bolt, while rotation between the two is secured by a key or keyway, a shaped section such as a square, hexagon or other regular or irregular shape, splines or driving pin or any other known means of transmission, suitable provision for rotating the collar being provided externally to the tube ensures that the bolt can be screwed or unscrewed into its nut or anchorage within the tube.

2. In means for joining tubes in alignment or at angles or for attachment to plane surfaces as claimed in Claim 1, the provision of a split sleeve to freely enter the tube and adapted to fit the conical head of the bolt, so that on assembly when the collar is rotated to tighten the bolt into its nut or anchorage the sleeve being held between the collar and the advancing conical head of the bolt, is expanded so that its outer diameter grips the interior wall of the tube.

3. In means of joining tubes in alignment as claimed in Claims 1 and 2 the provision of a nut or anchorage suitably secured within the tube to be joined and threaded to receive the screwed end of the bolt, so that on assembly, when the collar is rotated to tighten the bolt into the nut the sleeve being held between the collar and the advancing conical head of the bolt is expanded so that its outer diameter grips the interior wall of the tube and the assembly is held firmly in alignment.

4. In means for joining tubes at angles as claimed in Claims 1 and 2 the provision of a suitable anchorage for the reception of the screw of the conical headed bolt by strengthening the attachment tube by suitable means a reinforcement of metal or by the insertion of a suitable shaped nut to fit inside the tube or by reinforcing the tube and fitting a nut on the extreme diameter.

5. In means for joining tubes to plane surfaces as claimed in Claims 1 and 2 the provision of an anchorage for the reception of the screw of the conical headed bolt.

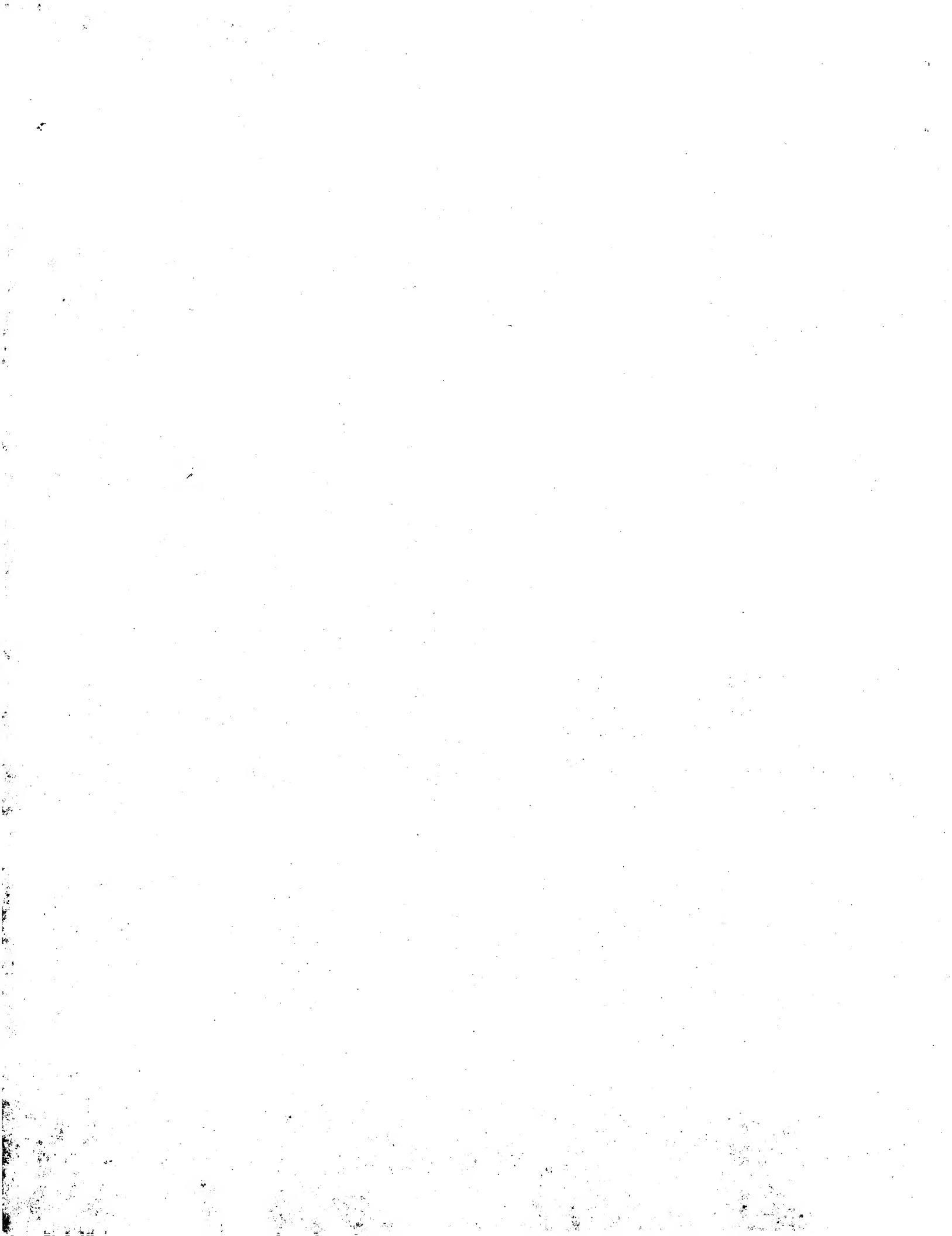
6. In means for joining tubes in alignment as claimed in Claims 1 and 2 the provision of a tubular conical headed bolt in which the bolt can be operated by a tommy bar through a hole in the collar and a suitable hole in the tubular bolt.

7. Means for joining tubes in alignment or at angles or for the attachment of tubes to plane surfaces substantially as claimed in the above Claims 1 to 6 and as generally described in the specification and accompanying drawings.

Dated this 19th day of June, 1949.

A. T. PORTER,
G. M. ROBERTS.

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663.755

COMPLETE SPECIFICATION

85
2,4

S.

FIG. 1.

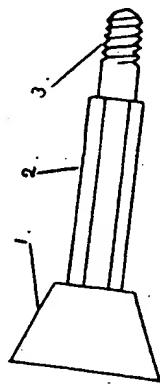


FIG. 2.

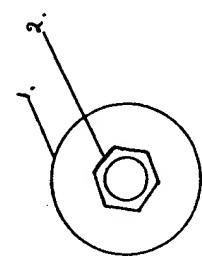


FIG. 3.

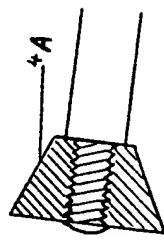


FIG. 4.

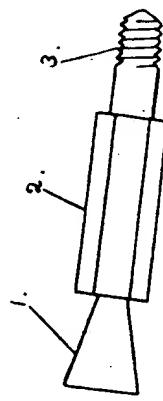


FIG. 5.

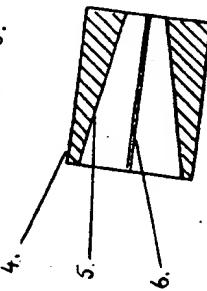


FIG. 6.

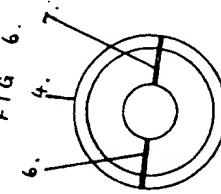


FIG. 7.

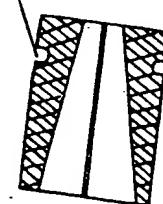


FIG. 8.

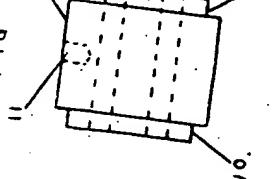


FIG. 9.

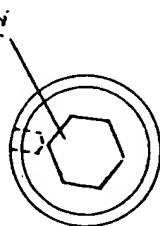


FIG. 10.

